



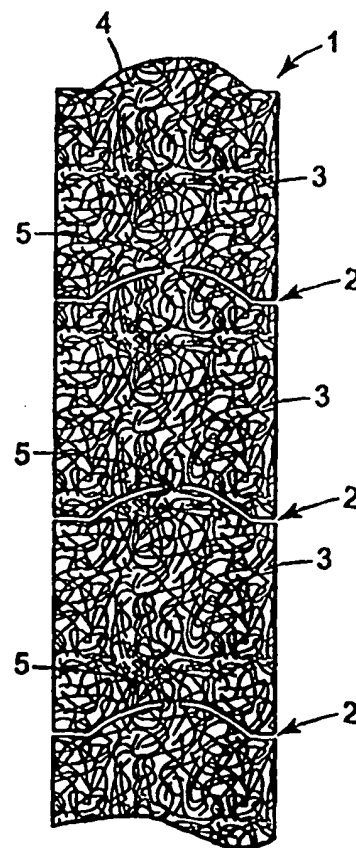
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| <p>(21) International Application Number: PCT/US99/14539</p> <p>(22) International Filing Date: 28 June 1999 (28.06.99)</p> <p>(30) Priority Data: 9816681.2 31 July 1998 (31.07.98) GB</p> <p>(71) Applicant (for all designated States except US): MINNESOTA MINING AND MANUFACTURING COMPANY [US/US]; 3M Center, P.O. Box 33427, Saint Paul, MN 55133-3427 (US).</p> <p>(72) Inventors; and (75) Inventors/Applicants (for US only): MATEOS, Maria del Mar Casado [ES/ES]; Los Yebenes, 82, 5th B., E-28047 Madrid (ES). ALDASORO, Felipe Barandiaran [ES/ES]; calle Molino, 15, Loeches, E-28890 Madrid (ES).</p> <p>(74) Agents: HAKAMAKI, Michaele, A. et al.; 3M Innovative Properties Company, Office of Intellectual Property Counsel, P.O. Box 33427, Saint Paul, MN 55133-3427 (US).</p> | <p>(81) Designated States: AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).</p> <p>Published With international search report.</p> | |

(54) Title: CLEANING PADS FORMED FROM NON-WOVEN ABRASIVE WEB MATERIAL, ESPECIALLY FOR DOMESTIC USE

(57) Abstract

A dispenser package comprises a box-shaped dispenser (12) containing a longitudinally-extending web (6) of lofty, non-woven, abrasive material comprising fibres having a tenacity of at least 7.0 g/dtex., which is partially cut, at intervals along the length of the web, along bowed transverse lines (2) enabling the web to be separated readily into pads (3). The web, which has a thickness less than 1 cm and a weight less than 500 g/m², is Z-folded at the joins (5) between adjacent pads and can be withdrawn from within the dispenser through a slot-shaped opening (10) in the latter.



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CLEANING PADS FORMED FROM NON-WOVEN ABRASIVE WEB
MATERIAL, ESPECIALLY FOR DOMESTIC USE

5 The present invention relates to cleaning pads formed from non-woven abrasive web material, and is especially concerned with cleaning pads which are suitable for domestic use.

Cleaning pads for domestic use are available in many forms and can be made from many materials, including low density, non-woven abrasive web
10 material of the type described in US-A-2 958 593. Cleaning pads formed from that type of material are conventionally provided to users already pre-cut, and are sold individually or stacked together in a package. One form of pad which is currently available has a thickness of about 1 cm and is formed from a web having a weight of 650 g/m² or more.

15 US-A-5 712 210 describes a non-woven abrasive web material intended for use as a surface conditioning product. The material is provided in the form of a shrink-wrapped roll which is intended to be unwound from the centre, and is sufficiently self-engaging that it will retain itself in rolled-up form. The web material is perforated at intervals so that individual lengths can be detached from
20 the roll as required. The possibility is mentioned of alternative packaging and dispensing means for sheets of the material, including a Z-fold dispenser.

So-called Z-fold dispensers are, in themselves, known for non-abrasive materials such as paper. US-A-297 2117, for example, describes a box containing a strip of tickets in zig-zag form. The box has a slot through which the tickets can
25 be withdrawn and torn off as required. Spanish Utility Model No. 1 033 650 describes a similar container for a band of textile material, and WO96/20884 describes a dispenser in the form of a flexible enclosure in which a non-woven web is disposed in a serpentine manner.

The present invention is concerned with providing, in convenient form,
30 cleaning pads of a non-woven abrasive web material, which are particularly suitable for domestic use. Pads of that type can, by their nature, have a limited life and it is of advantage to the user to have a supply which is readily available when required but is conveniently packaged and easy to store.

The present invention provides a longitudinally-extending web of lofty, non-woven, abrasive material, comprising fibres having a tenacity of at least 7.0 g/dtex., the web having a thickness less than 1 cm and a weight less than 500 g/m²,
5 and being partially cut at intervals along the length of the web along transverse lines enabling the web to be separated readily into pads, each transverse line extending from one side of the web to the other, and being bowed in the direction along the length of the web.

The web may be wound into the form of a roll, in which case the roll
10 preferably has a coreless center and is encased in a wrapping whereby the web can be accessed and unwound from the coreless center.

Alternatively, the web may be Z-folded at the mid-point regions of the transverse lines, in which case it may be contained in a box-shaped dispenser having a slot-shaped opening through which web material can be withdrawn from
15 within the dispenser.

The term "bowed" as used herein means curved or bent.

By way of example only, embodiments of the invention will be described with reference to the accompanying drawings, in which:

Fig. 1A shows part of a longitudinally-extending web of abrasive material
20 in accordance with the invention;

Fig. 1B and 1C are similar to Fig. 1A but show respectively, alternative shapes for cutting lines in the web;

Fig. 2 shows the web material of Fig. 1A in the form of a roll;

Fig. 3 is a side view of the web material of Fig. 1A in Z-folded form;

25 Fig. 4 is a plan view the web material of Fig. 3;

Figs. 5 and 6 show alternative forms of dispenser for the web material of Figs. 3 and 4;

Fig. 7 shows a dispenser as in Fig. 5 or Fig. 6, partially cut away to show the web material inside; and

30 Fig. 8 shows a dispenser for the web material in the form of a roll.

Fig. 1A shows part of a length of non-woven abrasive web material 1. The material is partially pre-cut at intervals along its length, as indicated at 2, so that it can be readily separated into individual pads 3 which are suitable for domestic cleaning purposes, particularly for cleaning cutlery, crockery and cooking utensils, and for cleaning baths and sinks.

Non-woven abrasive web materials and methods for their manufacture are described in US-A-2 958 593, to which reference may be made for information on the general nature of the web material 1. The abrasive web is formed by first forming an air-laid web of staple fibres using a "Rando-Webber" machine, commercially available from the Rando Machine Corporation of Macedon, N.Y., USA. The fibre web is conveyed to a horizontal two-roll coater, in which a so-called "pre-bond" resin is applied to both sides of the web, following which the web is conveyed to an oven in which the resin is cured. The web is then conveyed to a spray booth in which it is sprayed on one side with a resin/abrasive slurry following which it conveyed again to an oven to cure the slurry resin. The second side of the web is then sprayed with the same resin/abrasive slurry and the web is conveyed yet again to an oven for the final curing step. In certain cases, in which the abrasive characteristics of the roll-coated web are adequate, the spraying of the web with the resin/abrasive slurry can be omitted.

Further details of the process as applicable to the web material of Fig. 1A, including details of the composition of suitable pre-bond resins and resin/abrasive slurries, will be given below.

The abrasive web material 1 of Fig. 1A has a width suitable for cleaning pads for domestic use, typically in the range of from 5 to 10 cm and has a thickness which is typically in the range of from 2 to 7mm. The transverse cutting lines 2 are spaced apart by a uniform distance, typically in the range of from 5 to 15 cm. As shown in Fig. 1A, the lines 2 do not extend straight across the web 1 but are bowed towards the leading edge 4 of the web. Typically, the mid point of each transverse cutting line 2 is located about 1 cm in front of the ends of the line, in the direction towards the leading edge 4 of the web and, at each end, the cutting line straightens out to meet the side edge of the web at a right angle. That particular shaping for the cutting lines 2 is not essential, however. Figs. 1B and 1C each show alternative

shapes of cutting lines 2 which are also bowed towards the leading edge 4 of the web. In Fig. 1B, each cutting line 2 comprises two substantially straight inclined sections, and in Fig. 1C each cutting line 2 comprises a simple curve. The pre-cutting of the web along the lines 2 is intended to leave the pads 3 joined together in such a way that they can be readily separated and, preferably, just leaves the individual pads joined together over a very short distance (typically a few mm) in the centre of the web as indicated at 5.

The fibres from which the web 1 is formed are high-tenacity polymeric fibres, particularly polyamide fibres, having a staple length of 40 mm. By "high-tenacity" is meant a tenacity value of at least 7g/dtex. A suitable fibre material is high tenacity, 15 denier nylon fibre. The staple fibres are formed into a fibre web having a weight in the range of from 60 to 80g/m², typically 70g/m², and the fibre web is roll-coated and sprayed as outlined above (and described in greater detail below) to yield an abrasive web which can be rolled up or Z-folded but which has a surface-to-surface engagement force low enough to permit the individual pads, which are of comparatively small dimensions, to be pulled readily from the web in either of those configurations.

Examples of various coatings that can be applied to the above-described 70g/m² fibre web to produce abrasive webs in accordance with the invention will now be described.

EXAMPLE 1

A pre-bond resin is applied to both sides of the fibre web, in a horizontal two-roll coater, at a wet weight of 133g/m². The pre-bond resin has the following general composition, by weight:

| | |
|-------------------|-------|
| Water | 34.5% |
| Antifoaming agent | 0.2% |
| Pigment | 7.6% |
| Resin | 57.7% |

Any suitable resin known for use in the production of non-woven abrasive materials can be used in the above composition, typically a phenolic resin. Likewise, any suitable antifoaming agent known for use in the production of non-

woven abrasive materials can be used in the above composition, typically an aqueous emulsion of dimethyl-polysiloxane.

After passing through the two-roll coater, the "wet" web is conveyed to an oven at a temperature of 165 - 170°C, to initiate curing of the pre-bond resin. A resin/abrasive slurry is then sprayed onto one side of the mat at a wet weight of 376g/m². The resin/abrasive slurry has the following general composition, by weight:

| | | |
|----|---------------|--------|
| | Water | 22.25% |
| | Pigment | 3.85% |
| 10 | Soft abrasive | 29.0% |
| | Resin | 45.0% |

The resin used may be as described above for the pre-bond resin. The soft abrasive may comprise any suitable abrasive material having a Mohs hardness of 7 or less and is preferably an organic polymeric material, for example polyester, poly(vinyl chloride), poly(methacrylic acid), polymethylmethacrylate, polycarbonate, polystyrene, and particles of thermosetting polymers such as melamine-formaldehyde condensates. The particle size of the abrasive material can be any desired size but typical sizes are from an average diameter of about 400 μm down to an average diameter of about 50 μm. After spraying, the web is conveyed to an oven at a temperature of about 175°C, to cure the slurry resin. A resin/abrasive slurry having the same composition is then sprayed onto the other side of the web, at the same wet weight, and the resin is cured under the same conditions. The cured web was then wound on a winding mandrel to form a large ("jumbo") roll of non-woven abrasive material which is subsequently slit longitudinally into strips, 7.5 cm wide. The strips are then pre-cut transversely, as shown at 2 in Fig. 1A, at intervals of 10 cm.

EXAMPLE 2

The method of Example 1 is followed, except that the pre-bond resin has the following general composition, by weight:

| | | |
|--|-------------------|-------|
| | Water | 38.6% |
| | Antifoaming agent | 0.3% |

| | |
|---------|------|
| Pigment | 1.8% |
|---------|------|

| | |
|-------|-------|
| Resin | 59.3% |
|-------|-------|

and the resin/abrasive slurry has the following composition by weight:

| | |
|-------|-------|
| Water | 14.3% |
|-------|-------|

| | | |
|---|----------------|-------|
| 5 | Pigment/colour | 4.23% |
|---|----------------|-------|

| | |
|-------|-------|
| Resin | 20.5% |
|-------|-------|

| | |
|-------------------------|-------|
| Soft inorganic abrasive | 10.0% |
|-------------------------|-------|

| | |
|---------------|-------|
| Hard abrasive | 51.0% |
|---------------|-------|

- 10 The soft abrasive may comprise any suitable inorganic abrasive material having a Mohs hardness of 7 or less, for example garnet, flint, silica, pumice, and calcium carbonate. The hard abrasive may comprise any suitable abrasive material having a Mohs hardness of 8 or more, for example silicon carbide, aluminium oxide, topaz, fused alumina-zirconia, boron nitride, tungsten carbide, corundum,
- 15 and silicon nitride.

EXAMPLE 3

The method of Example 1 is followed, except that the pre-bond resin has the following general composition, by weight:

| | | |
|----|-------|-------|
| 20 | Water | 38.2% |
|----|-------|-------|

| | |
|-------------------|------|
| Antifoaming agent | 0.3% |
|-------------------|------|

| | |
|---------|------|
| Pigment | 2.1% |
|---------|------|

| | |
|-------|-------|
| Resin | 59.4% |
|-------|-------|

and the resin/abrasive slurry has the following composition by weight:

| | | |
|----|-------|-------|
| 25 | Water | 20.3% |
|----|-------|-------|

| | |
|---------|------|
| Pigment | 2.1% |
|---------|------|

| | |
|-------|-------|
| Resin | 27.6% |
|-------|-------|

| | |
|---------------|-------|
| Hard abrasive | 50.0% |
|---------------|-------|

- 30 The resins and the antifoaming agent used may be as described above for Example 1, and the hard abrasive may be as described above for Example 2.

The pre-cut web strips of Examples 1 to 3 can be packaged as a large roll (shown in Fig. 2), or can be divided into shorter lengths comprising about 10 to 15 of the pads 3 (Figs. 1A-1C) and then packaged. A preferred configuration in which such a shorter length is packaged is a Z-folded configuration shown in Figs. 3 and 4. The web is folded at the mid-point region 5 of each transverse cut line 2 as in Fig. 1A, for example, to form stack 6 in which each layer 7 comprises a single pad 3 and is joined to the layer below by the uncut portion 5 at the end of the pad. Because the cut lines 2 are curved, the ends of alternate pads in the stack are aligned, as can be seen from Fig. 4. If, as an alternative, the cut lines 2 were not curved but extended straight across the web at right angles to the sides, the ends of all of the pads would be aligned when the web is Z-folded.

Suitable packages for a Z-folded web are illustrated in Figs. 5 and 6. In each case, the web is contained in a box the dimensions of which are just slightly greater than the dimensions of the stack 6 so that the latter is comfortably contained. The box 8 of Fig. 5 is taller and shorter than the box 9 of Fig. 6, and is thus able to contain a greater number of shorter pads. Each box has a slot 10 in its top face 11, through which the web 1 can be withdrawn. Fig. 7 also shows a Z-folded web contained within a box 12 but, in this case, one side of the box is cut away to show the stack 6 inside. The pad 3 which forms the top layer of the stack 6 projects partly through the slot 10 in the top face of the box and, when that pad is required for use, it is pulled from the box followed by the next pad to which it is still joined by the uncut web portion 5 as shown in Fig. 1A, for example. When that next pad 3 projects through the slot 10 to a sufficient extent, the user detaches the first pad by simply breaking the connecting portion 5. The surface-to-surface engagement force of the pads 3 is low enough to permit one layer of the stack 6 within the box to disengage comparatively easily from the next, and allow the pads to be withdrawn from the box as described.

The boxes 8, 9 and 12 can be formed from any suitable material for example cardboard which is preferably treated (for example, plasticized) to resist moisture.

An alternative package for a length of web comprising about 10 to 15 pads is illustrated in Fig. 8. In this case, the web is in the form of a coreless roll 13 which is contained within a transparent shrink wrap 14. The shrink wrap 14 forms a package which is about 6 cm in diameter with a hole 15 of about 3 cm in diameter at one end. Pads are withdrawn from the package from the centre of the roll, as illustrated in Fig. 7 which shows the centremost pad 3 projecting from the package. When that pad is required for use, it is pulled from the package followed by the next pad to which it is still joined by the uncut web portion 5. When that next pad projects from the package to a sufficient extent, the user detaches the first pad by simply breaking the connecting portion 5. The surface-to-surface engagement force of the pads 3 is low enough to permit the centremost pad within the package to disengage comparatively easily from the surrounding roll, and allow the pads to be withdrawn from the box as described.

It will be appreciated from the above that the strength of the uncut portions 5 which join adjacent pads 3 must be sufficient to enable the web to be pulled from one end to allow the user access to the first pad, but low enough to allow the user then to separate that pad from the rest without undue difficulty. A single junction of a few millimetres to the centre of each cutting line 2, as described above, has been found to be satisfactory for webs of the type illustrated in the Examples. Transverse cutting lines 2 having a bowed form are comparatively easy to produce in non-woven abrasive webs of the type described above, and have been found to result in pads that have clean, well-defined edges and can readily be separated from each other. Moreover, the pads 3 conform better to the shape of the user's hand than pads with straight ends.

25

What Is Claimed Is:

1. A longitudinally-extending web of lofty, non-woven, abrasive material, comprising fibres having a tenacity of at least 7.0 g/dtex., the web having a
5 thickness less than 1 cm and a weight less than 500 g/m², and being partially cut at intervals along the length of the web along transverse lines enabling the web to be separated readily into pads, each transverse line extending from one side of the web to the other, and being bowed in the direction along the length of the web.
- 10 2. A web as claimed in claim 1, in which the fibres are polyamide fibres.
3. A web as claimed in claim 1 or claim 2, in which the web is cut through completely along the bowed line, except in a mid-point region of the line.
- 15 4. A web as claimed in any one of the preceding claims, the web being wound into the form of a roll.
5. A web as claimed in claim 4, in which the roll has a coreless center and is encased in a wrapping whereby the web can be accessed and unwound from the
20 coreless center.
6. A web as claimed in claim 3, in which the web is Z-folded at the mid-point regions of the transverse lines.
- 25 7. A web as claimed in any one of the preceding claims, in which the web has a width in the range of from 5 to 10 cm.
8. A web as claimed in any one of the preceding claims, in which the transverse partial cuts are spaced apart along the length of the web by a distance in the range
30 of from 5 to 15 cm.
9. A web as claimed in any one of the preceding claims, in which the thickness of

the web is in the range of from 2 to 7 mm.

10. A dispenser package comprising a box-shaped dispenser containing a web as claimed in claim 6, the dispenser having a slot-shaped opening through which web material can be withdrawn from within the dispenser.

11. A package as claimed in claim 10, in which the opening is in a face of the dispenser parallel to, and adjacent, the upper face of the Z-folded web, the opening extending transversely across the web.

10

12. A package as claimed in claim 11, in which the opening is located centrally in the said face of the dispenser.

13. A package as claimed in any one of claims 10 to 12, in which the depth of the dispenser is sufficient to contain a length of Z-folded web corresponding to 10 to 15 pads.

15

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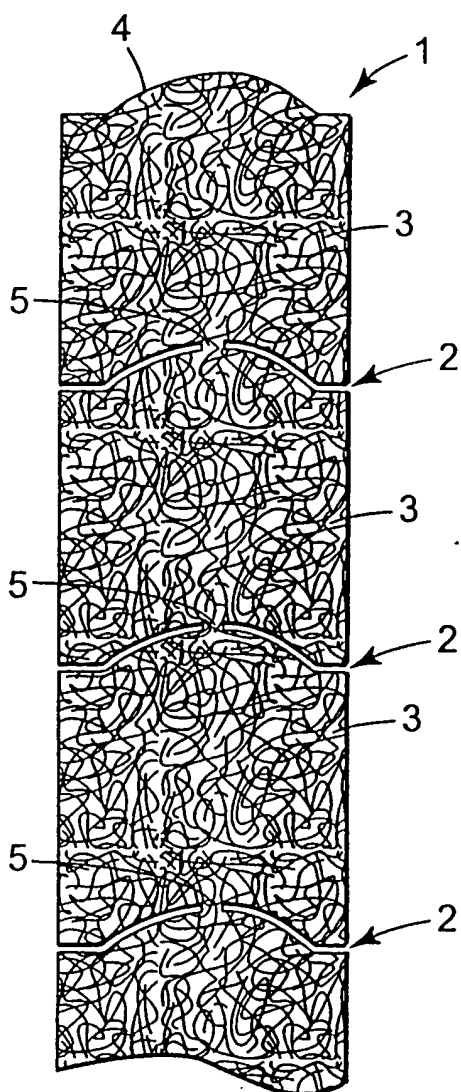


Fig. 1A

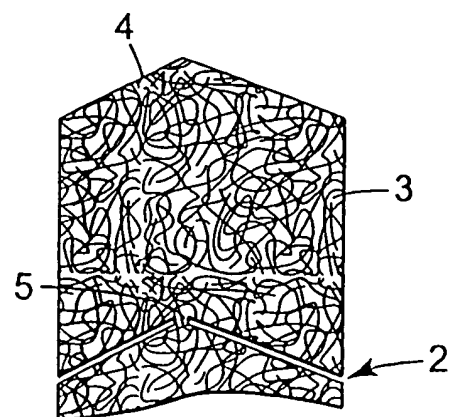


Fig. 1B

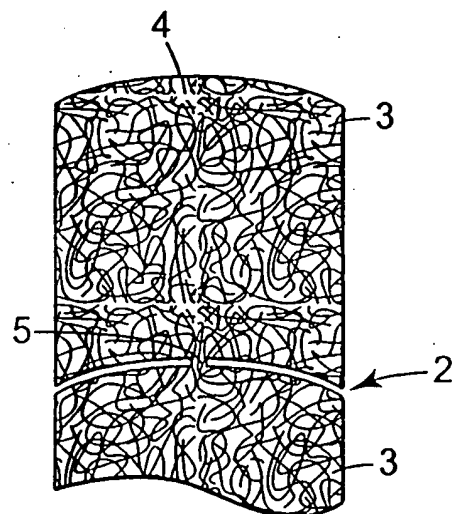


Fig. 1C

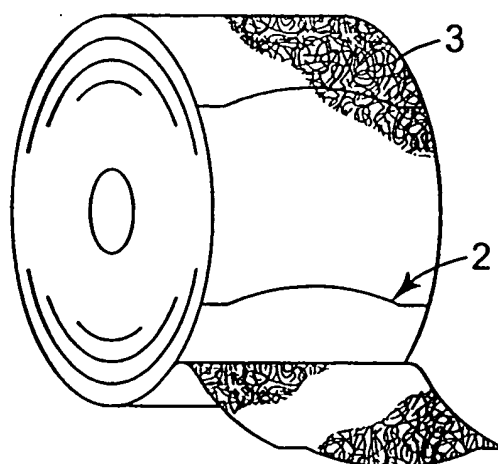


Fig. 2

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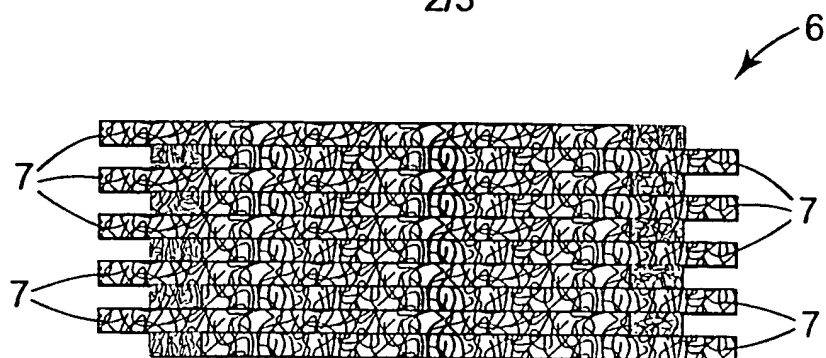


Fig. 3

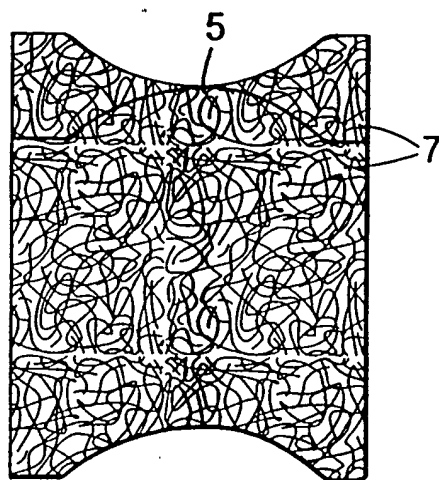
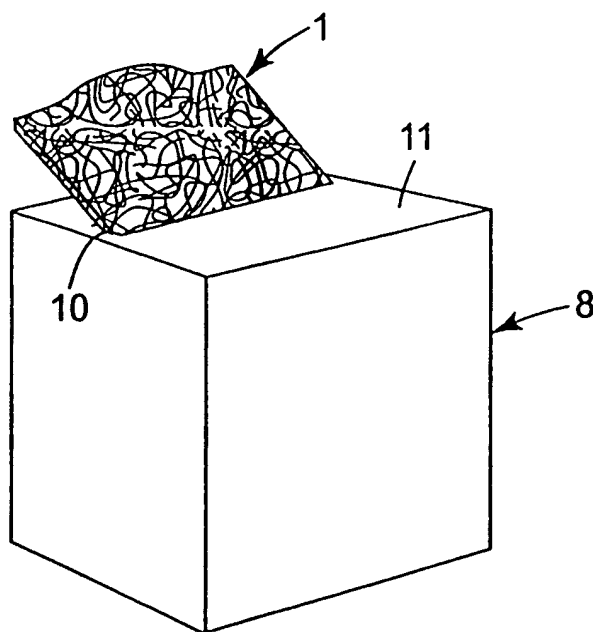


Fig. 4



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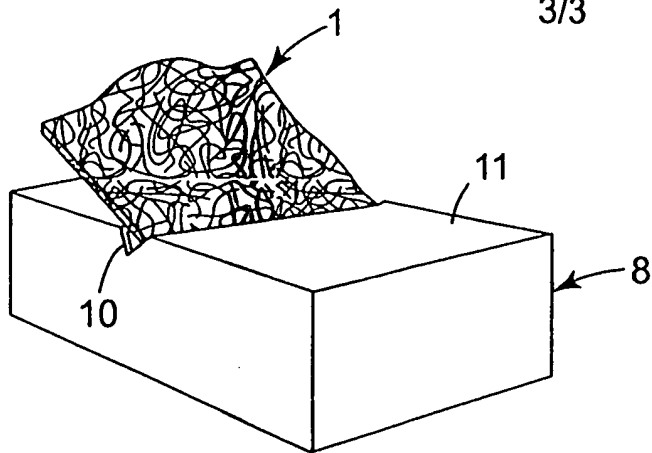


Fig. 6

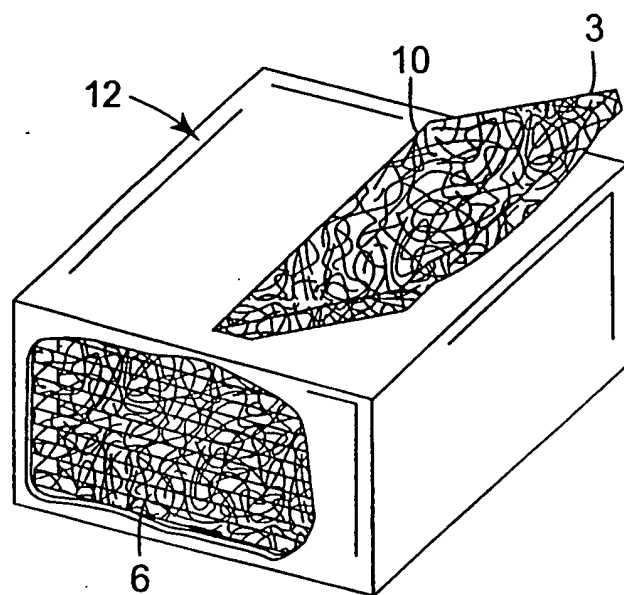
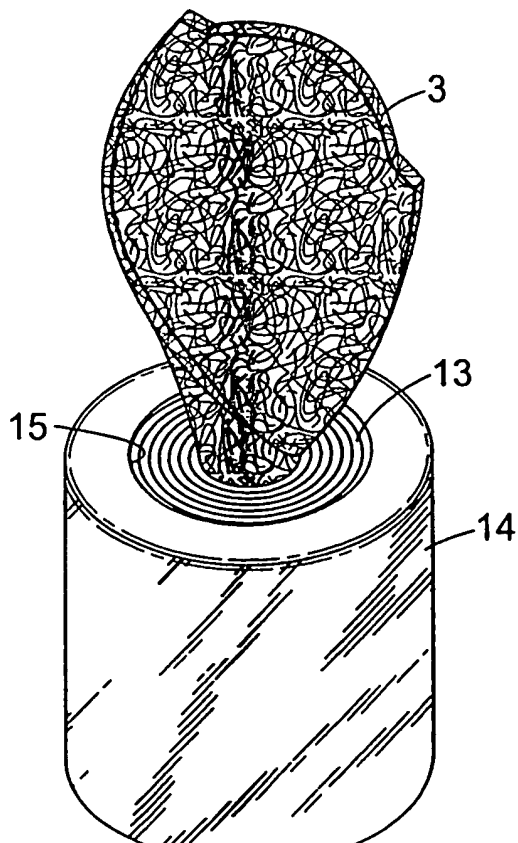


Fig. 7



INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 99/14539

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 B24D11/00 B26F1/22 B65D83/08

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

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IPC 7 B24D B26F B65D

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Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category * | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|------------|---|-----------------------|
| A | US 5 712 210 A (WINDISCH LAURIE A ET AL) 27 January 1998 (1998-01-27) cited in the application abstract; figure 2 --- | 1 |
| A | US 2 682 306 A (L. SCHRIBER) 29 June 1954 (1954-06-29) column 5, line 22 - line 39; figures 9-12 --- | 1 |
| A | US 4 245 765 A (GREGG EDWARD H) 20 January 1981 (1981-01-20) ----- | |

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Information on patent family members

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| Patent document cited in search report | | Publication date | Patent family member(s) | Publication date |
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